PATENT ANL-IN-03-023

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Ruxandra Baurceanu et al.
Title	:	LAYERED STRUCTURE OF CU-CONTAINING SUPERCONDUCTOR AND AG OR AG ALLOYS WITH CU
Serial No.	:	10/648,052
Filing Date	:	August 26, 2003
Art Unit	:	1754
Examiner	:	Colleen P. Cooke
Docket No.	:	ANL 273
Date	:	November 14, 2005

CERTIFICATE OF EXPRESS MAIL
I hereby certify that this correspondence is being forwarded via Express Mail No. EV693419624 US, before the last scheduled pick-up, and addressed to: Commissioner for Patents, P.O. Box 1450, Mail Stop Non-Fee AMENDMENT, Alexandria, VA 22313-1450, on
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Director of Patents
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF U. BALACHANDRAN

Declarant states as follows:

1. I am an inventor in the above-identified application.

2. I provided a calculation for the Examiner relating to the amount of copper in U.S. Patent No. 6,743,531 issued to Onabe et al. June 1, 2004, which was forwarded to the Patent and Trademark Office.

3. I have carefully reviewed the Examiner's calculations provided in the Office Action dated September 19, 2005 and respectfully disagree with the Examiner's calculations for the following reasons.

4. From Embodiment 1 of the Onabe et al. '531 patent, paragraphs 0185-0187, the Examiner calculated the concentration of Copper by taking the entire volume of the Base (Ag) which is 0.150 cm^3. The Examiner forgot that a copper diffusion layer has a layer thickness of 200 nanometers (0.2 micron) formed on the base. The Base has an area of 5 cm^2. The Examiner took a value of 200 microgram Cu/cm^2 and multiplied it by number 5 to get 1000 microgram Cu. She then calculated the amount of silver present in the entire base (volume 0.150 cm^3) using density of silver. Then from the relative amounts of copper & silver, the Examiner arrived at the value of 0.1078 atom% Cu.

5. Onabe et al. at paragraphs 0027, 0028 and 0100, as well as Embodiment 1, clearly state that the diffusion layer is only 200 nanometers (Onabe et al. claims the diffusion layer has to be within 100-300 nanometers), see Embodiment 2, paragraph 0224. Therefore for 5 cm^2 area by 0.2 micron thickness the volume will be ($1x10^{-4}cm^3$). Now, following exactly the way the Examiner calculated the amount of silver in a given volume, I get a number 10.49×10^2 microgram for this volume of diffusion layer. Now we have 1000 micrograms of copper and 1049 micrograms of silver in the diffusion layer of dimension 10-mm(W) x 50-mm(L) x 200 micron (t). Using the atomic weights of copper &

silver used by the Examiner and following her own method, I arrive at 61.8057 atom% copper.

6. The Examiner concentrated on the copper content of the surface where as in the subject application, the copper is distributed everywhere in the entire substrate (i.e., 0.1-0.3 at.% of copper is distributed throughout the entire substrate).

7. The Examiner's calculation provide four values for the copper content--0.1078 atom%, 0.1112 atom%, 0.1616 atom%, and 0.1649 atom% for the surface concentration of 200 - 300 microgram/cm2. Onabe et al. claim is 50-300 microgram Cu/cm2. In the subject application, we claim copper content between about 0.1 and about 0.3 atom %. The application in Figures 3 and 4 show the optimum result is 0.2 atom% Cu. On Page 5, 2nd paragraph of the instant application, it is stated that "silver or silver alloy layers having a Cu content of about 0.2 atom% give the best superconducting properties". This 0.2 atom% Cu is outside the range of the Onabe et al. disclosure.

8. Onabe et al. discloses that the thickness of the copper-diffused layer has to be within 100-300 nanometers (0.1 - 0.3 microns), paragraph 0028, whereas in the instant application, the copper is distributed homogeneously throughout the entire substrate. If

copper is concentrated just at the surface (as in the case of Onabe et al.) then copper from the substrate can diffuse into the superconductor, change stoichiometry of superconductor, and finally degrade its superconducting properties.

9. That all statements made in this declaration of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon or any patents to which this declaration is directed.

Further declarant sayeth not.

Dated: 11/15/05

Uthamalingam Balachandran

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Dr. Balachandran has been doing research in the area of electronic materials for over 25 years. His current interests include ceramic membranes for gas separation, hydrogen production, and natural gas upgrading, high–temperature superconductors, fuel cells, and capacitors. He has been an invited speaker at numerous conferences in several countries. He is a Fellow of The American Ceramic Society, a Fellow of the Institute of Physics, and currently the Manager of Ceramics Section at Argonne National Laboratory.

EDUCATION

Ph.D.	Materials Science, Oregon Graduate Institute, Oregon, 1980.
M.E.	Metallurgical Engineering, Indian Institute of Science, India, 1977.
B.E. (Honors)	Metallurgy, University of Madras, India, 1975.

WORK HISTORY

1987–present	Argonne National Laboratory, Argonne, IL.
1982–1987	Raychem Corp., Menlo Park, CA.
1980–1982	Oregon Graduate Institute, Beaverton, OR.

PUBLICATIONS

Authored/coauthored more than 250 papers, edited 11 books, and holds 27 patents. He has won three R&D 100 Awards, two Federal Laboratory Consortium (FLC) Award for Excellence in Technology Transfer, two FLC Award of Merit, four Pacesetter Awards, three Director's Awards, and University of Chicago's Distinguished Performance Award (the highest honor offered at Argonne National Laboratory for scientific achievement).

PROFESSIONAL SOCIETIES

Fellow, The American Ceramic Society
Fellow of the Institute of Physics
Member, Materials Research Society
Board Member, International Cryogenic Materials Commission (ICMC)
Board Member and Vice-President, Applied Superconductivity Conference, Inc.
Member, Editorial Board, Superconductor Science & Technology
Overseas Coeditor, Journal of Materials Transactions, The Japan Institute of Metals
Member, Editorial Board for Journal of Materials Physics and Mechanics
Member, IEEE Council on Superconductivity, Advisory Committee